

IV. CONCLUSIONS AND IMPLICATIONS

The findings of the case studies at the three study sites, namely Naubise in the low hills, Dhuskun in the middle hills, and Yelung in the high hills indicate that the Yelung Site is relatively better-off in forest and grazing resources compared to the other two sites and, consequently, the size of livestock holding is also much higher at the former site. However, the per capita availability of cultivated land is relatively higher at Naubise and Dhuskun. Thus, pressure on cultivated land is found to be the highest at Yelung and the lowest at Naubise. The Naubise Site is also better privileged in terms of accessibility and availability of inputs, services, and irrigation and market facilities compared to the other two sites. Agriculture seems to have significantly transformed at Naubise where the use of modern inputs in farming is reported to be quite high. Agricultural practices are mostly traditional at the other two sites with very little use of modern inputs in farming. As a result, the productivities of both crops and livestock are higher at Naubise compared to those at the other two sites.

The analysis of the linkages among the different components of the farming systems at the three study sites reveals the following:

- o crop-livestock linkages are almost equally strong at all the study sites;
- o crop-forestry linkages are strongest at Yelung, followed by Dhuskun and Naubise;
- o livestock-forestry linkages are stronger at Yelung than those at Dhuskun and very weak at Naubise;
- o household-forestry linkages are strong at Dhuskun and Yelung and non-existent at Naubise;
- o crop-livestock-household linkages are strong at all the study sites; and
- o linkages with the market are the strongest at Naubise, followed by Yelung and Dhuskun.

The above findings can be generalized to imply that farming-forestry-livestock linkages are strong in areas which are relatively better-off in forest resources and where there is little intervention of market forces and little transformation has taken place in agriculture. In contrast, these linkages are weak in areas where forest resources are scarce and there is a strong influence of market forces on farming, and, as a result, agriculture has significantly transformed. In such areas, most of the material inputs previously derived from forests have been replaced partly by market products and partly by farm products. Changes in farming practices such as the reduced size of livestock-holdings, changes in herd composition of livestock, increased stall-feeding practices, increased use of chemical fertilizers, and increased use of crop by-products as livestock feed and fuel for cooking have also helped reduce the dependency on forest resources.

Discussions with the elderly and knowledgeable farmers indicated that the overall linkages with forestry have become weaker over time, not only due to gradual reduction in forest areas but also due to deterioration in the conditions of forests with adverse effects on environment and the productivity of the farming system, particularly in those areas where market forces have little influence on farming. Fodder trees are reportedly disappearing from forests and no efforts have been made to include these trees in new plantations established by the Government. While the

adverse effects of dwindling forest resources on farm productivity have been countered by increased use of market inputs in accessible areas, the environmental problems are serious everywhere. The twin objectives of increasing agricultural productivity and protecting the environment seem to be rather conflicting if the existing farming-forestry-livestock linkages are considered in the context of dwindling forest resources. While strong linkages are essential for increasing agricultural productivity, the same may lead to forest degradation and environmental deterioration. In such a situation, development efforts and strategies have to be balanced in such a way that both the objectives of increasing productivity and improving environment are met.

For the protection and improvement of environment, the existing pressures on forests for various products have to be eased on the one hand and forestry development activities have to be accelerated on the other. This may, in the short-run, lead to increased shortages of material inputs supplied by forests to farming. In order to balance these shortages, improvements are essential not only in market facilities but also in farming practices. While increased input supply from the market will partly make up for the shortages, increased plantation of fodder and fuelwood trees on the farmland, reduction in sizes of livestock holdings by replacing poor breeds with a smaller number of more productive breeds, increased stall-feeding practices, improvements in irrigation facilities, efficient use of compost through improvements in preparation and application methods, increased use of chemical fertilizers and improved seeds, increased multiple cropping practices, and efficient use of fuelwood through adoption of improved stoves for cooking will not only augment agricultural productivity but also improve environmental conditions by reducing the pressure on forest resources. Forestry development programmes should be geared towards fulfilling the needs of local people rather than merely achieving the targets. In the context of increased shortages of livestock feed in the hills and mountains, adequate priority needs to be accorded to fodder trees in new plantations. Since the long-term success of any development programme depends to a large extent on the participation of local people, this aspect needs to be adequately addressed while initiating rural development programmes in general and forestry development programmes in particular.